

Aquatic Plant Management

Control of Duckweed and Watermeal

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Duckweed and watermeal are free-floating plants that can totally cover the surface of a pond. In addition to making a pond unsightly and not very appealing for swimming (Fig. 1), thick growths of these plants can harm the fish population. A surface layer of duckweed or watermeal will prevent sunlight from reaching the deeper parts of the water column. This means that underwater plants and algae can no longer photosynthesize and produce oxygen. The lack of oxygen can greatly stress or even kill fish; typically duckweed or watermeal infested ponds lose good fishing quality over a period of years.



Figure 1. A handful of watermeal plants.

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Identification

Individual **duckweed** plants are about an 1/8th to a 1/4 of an inch in width, so they are not very large. They are generally round in outline, with a single root hanging from each small plant (Fig. 2). **Watermeal** is much smaller compared to duckweed (Fig. 3); in fact, watermeal is the smallest flowering plant in existence. Watermeal plants look like tiny green seeds, each of which is less than 1/16th of an inch in width (Fig. 4). A handful of watermeal will feel gritty, like you are rubbing cornmeal (or grits) between your fingers.



Figure 2. Duckweed. Note the root hanging from each plant.

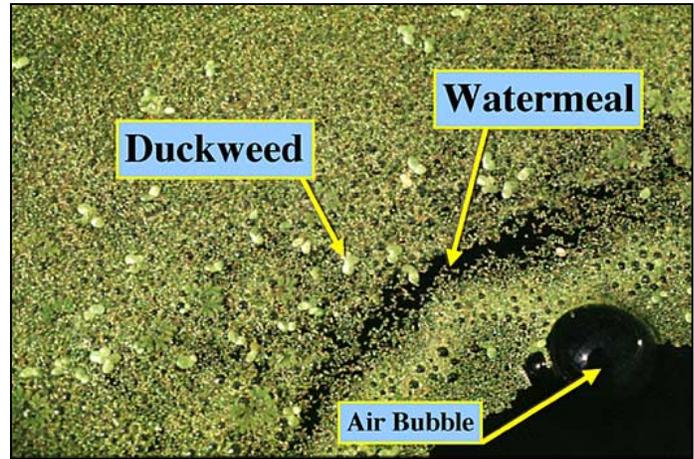


Figure 3. Duckweed and watermeal together (air bubble is included for size comparison).

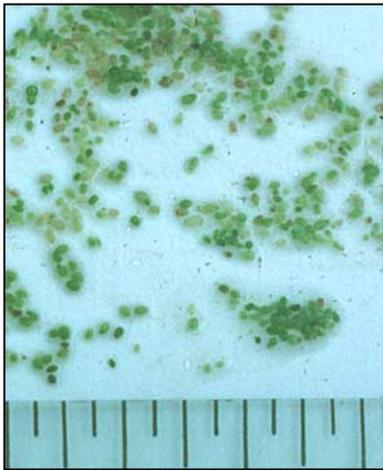


Figure 4. Watermeal. These plants do not have roots.

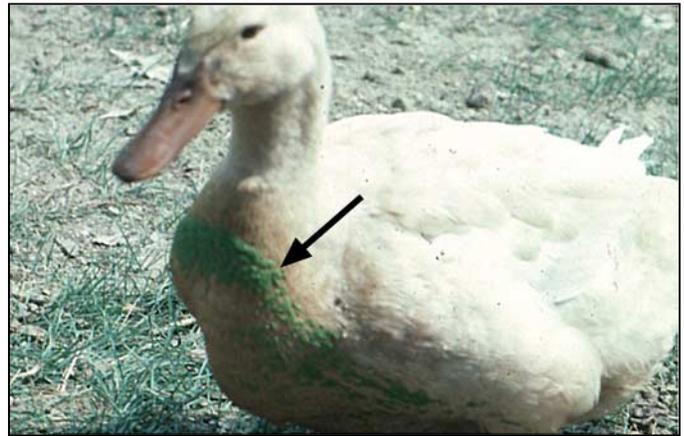


Figure 5. A duck with watermeal (arrow) clinging to its breast feathers.

Habitat

Both plants are typically found in ponds at the edge of or in woods. They are less frequently present in ponds located in open fields but can cause problems there, too. These plants require a lot of nutrients (nitrogen and phosphorus) to grow, so typically they are found in nutrient-rich environments such as in ponds that receive drainage from feed lots, leaky septic fields, and other similar situations. The association with trees suggests that leaf litter may play an important role in providing nutrients for growth. The bottom sediments of infested ponds are often very black and mucky. This organically rich material also can be a major source of nutrients.

Duckweed and watermeal can be spread easily from one pond to another by humans, or probably more frequently, by ducks and geese (Fig. 5). It is easy for these small plants to become lodged in the feathers of birds and then transported to a new home.

Both duckweed and watermeal tend to disappear from the pond surface in late fall. Why does this happen and where do the plants come from when they reappear the following spring? In the summer, the plants are photosynthesizing. This process produces food, which is stored as starch, and oxygen, which becomes trapped in the plant body and provides buoyancy. In the fall, the

accumulated starch makes the plants heavier, and as photosynthesis slows down and less oxygen is produced, the plants lose buoyancy. They sink to the sediments where they overwinter, relying on stored starch for energy. In the spring, the plants start photosynthesizing again and the accumulated oxygen causes them to rise to the surface.

Given enough nutrients, duckweed and watermeal can reproduce prolifically to cover an entire pond within a few weeks after coming to the surface. All species can reproduce by budding, and in some cases, a new plant will be produced every 24 hours.

Control

Non-chemical

The control of duckweed is difficult and is even more difficult for watermeal. There are few options for effective control. Any obvious sources of nutrient inputs (lawn fertilizers, leaf litter, drainage from feed lots) should be eliminated. Some people use elaborate skimming devices to scoop the plants off the surface. When this is done, the plants must be disposed of away from the pond basin so that they do not wash back into the water. There are no effective biological controls. Grass carp feed on duckweed only weakly, and they do not feed on watermeal at all.

Draining a pond is a drastic measure, but sometimes it is the only alternative if complete renovation is desired. To be effective, the bottom sediments, which contain both plants and the nutrient-rich sediments, must be scraped out or dredged.

The most effective control methods are chemicals. Two chemicals are labeled for the control of these plants. The ways in which they are used vary greatly.

Diquat

Diquat, which is sold under the trade name of Reward[®], is used at 1 gallon per surface acre. It is diluted in 50 to 150 gallons of water per acre and sprayed directly on the floating plants. A nonionic surfactant, which can be purchased at most places that sell Reward[®], must be added to the Reward[®]/water solution as directed on the Reward label.

Reward[®] is a contact herbicide. That means it immediately causes the plant tissue it comes into contact with to turn brown. Because duckweed and watermeal plants are so small, a single Reward[®] treatment will seldom make contact with and kill all the plants. In addition, Reward[®] does not persist in the water; it is typically gone from the water column by 7 to 10 days after treatment. Therefore, any plants that survive the initial treatment will start to regrow in a few days. A typical scenario after treatment with Reward[®] is that many of the plants will turn brown and sink but the survivors will regrow and again cover the pond.

Several treatments of Reward[®] usually have to be made in a single season to keep a pond relatively free of duckweed or watermeal. Treatments should begin as soon as the plants start to grow in the spring or early summer in order to “keep ahead” of the growth. It is helpful to treat when the wind has pushed the plants to one end of the pond; the spray should be concentrated on the plants in that area. However, do not forget to spray small patches that may still be floating on other parts of the pond or washed up along the banks.

Multiple treatments of Reward[®] can successfully control duckweed; unfortunately, they seldom give effective control of watermeal.

Fluridone

Fluridone, which is sold as Sonar* or as Avast!TM, is used at 1 quart per surface acre for the control of duckweed. It is essential that the Sonar* AS (not Sonar* SRP) or the Avast!TM (not Avast!TM SRP) formulations be used. According to the guidelines for Sonar*, the keys to good control of duckweed are that the pond outflow be stopped or minimized for at least 30 days or longer, and that the chemical be applied in two treatments 10-14 days apart. Therefore, for a one acre pond, 1/2 quart is applied initially followed by the other 1/2 quart 10-14 days later. Treatment should be made as soon as the plants start to appear in the spring. The chemical should be applied fairly evenly over the pond surface and plants, but it is not essential to get as thorough a coverage of the plants as it is with diquat.

Fluridone is not a contact herbicide. If it can be held in the water for 30 days, it will effectively control the duckweed plants that are present. The effect is very slow, and may not be noticeable for 2 or even 3 months after treatment. Affected duckweed plants will turn almost pure white, as shown on the watermeal plants below (Fig. 6).



Figure 6. Three of these six watermeal plants have turned white following exposure to Sonar*.

The nice thing about fluridone is that when it works, it really works well. Retreatments are not necessary, and sometimes the control will last a second year (although it may be helpful to apply a pint of Sonar* or Avast!TM at the beginning of the second season to kill any plants that may have survived).

As a general rule, fluridone is effective on most watermeal treatment sites, but sometimes there is no effect. The reason for this is as yet unknown. According to Sonar* guidelines, the dose for watermeal should be 1.5 quarts per surface acre if the average depth is more than 5 feet. Again, it is critical that there be no outflow from the pond and that the treatment be split.

A possible (but expensive) strategy for successful watermeal control is to kill the surface plants with a treatment of Reward and follow that with the split fluridone treatment to kill the recovering plants.

Cost Considerations

One of the main stumbling blocks to using fluridone is its cost. In 2001, the cost for a quart of Sonar* was approximately \$482, compared to one gallon of Reward, which cost approximately \$118 (prices may vary somewhat from distributor to distributor). Avast!TM, which is a generic form of fluridone sold by Griffin L.L.C., was available for approximately \$435. The SePRO company, which sells Sonar*, guarantees the results on duckweed if the application is made according to directions. Both companies offer a test (FasTEST for Sonar* and AVASTMTest for Avast!TM) in which the concentration of fluridone in the water can be determined within 48 hours. This is important if the pond owner is not seeing results and suspects that the chemical is no longer at a high enough concentration to be effective. For further information on these tests, contact the product dealers.

In analyzing the benefits of diquat versus fluridone, the pond owner must make a choice between a cheaper product that may have to be used over and over again, versus a more expensive product that, when it works, will give excellent control and even may prevent new growth the following year.

Water Restrictions

Both Reward[®] and Sonar* or Avast!TM treated water can be used for swimming and fishing immediately after use (although it is always advisable to wait 24 hours after treatment). Reward[®] treated water must not be used for irrigation for 1 to 5 days after treatment; drinking water, 1 to 3 days; and livestock watering, 1 day. Water treated with Sonar* or Avast!TM must not be used for irrigation of trees, turf, or crops for 7 to 30 days after treatment (check the label for exact restrictions). These chemicals also should not be applied within 1/4 mile of any functioning potable water intake.

NOTE: Additional restrictions can be imposed by states. Check with local and state regulatory agencies before using these products.

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